

**B.Sc. II (SEM III)**  
**3S- BOTANY**  
**ANGIOSPERM SYSTEMATICS, ANATOMY & EMBRYOLOGY**

**UNIT I : Angiosperm Systematics and Biodiversity.**

- 1.1 Angiosperms: Origin and Evolution (**Pteridospermean and Bennititalean Theory**)
- 1.2 Botanical Nomenclature: Principles of rules, Taxonomic Ranks, Type concept, Valid publication.
- 1.3 Herbarium – Concept & significance, Royal Botanical Garden, Kolkata.
- 1.4 Concept of biodiversity, Ex situ and In situ conservation
- 1.5 Concept & importance of Biodiversity.

**UNIT II: Angiosperm Systematics**

- 2.1 Systems of Classification: Bentham and Hooker's System, Engler and Prantle's system.
- 2.2 Systematic studies & economic importance of following Families  
Dicotyledons (Polypetalae) : Malvaceae, Brassicaceae, Leguminosae, Apiaceae,

**UNIT III: Angiosperm Systematics**

- 3.1 Systematic studies & economic importance of following Families  
Dicotyledons (Gamopetalae): Asteraceae, Asclepiadaceae, Apocynaceae, Solanaceae, Verbenaceae, Lamiaceae.
- 3.2 Dicotyledons ( Monoclamydeae): Euphorbiaceae.
- 3.3 Monocotyledons: Liliaceae, Poaceae.

**UNIT IV: Anatomy**

- 4.1 Types of Tissues:  
Meristematic – Types of meristems  
Permanent – Simple and complex.

- 4.2 Characteristics of growth rings, Sapwood and heartwood.
- 4.3 Anatomy of root: Primary structure in dicot and monocot root, normal secondary growth in dicot root.

### **UNIT V: Anatomy**

- 5.1 Anatomy of stem: Primary structure in monocot and dicot stem, normal secondary growth in dicot stem.
- 5.2 Anomalies in primary structure in *Boerhavia* stem, secondary structure in *Bignonia* and *Dracaena* stem.
- 5.3 Leaf Anatomy: Internal structure in *Nerium* and *Maize* leaf.

### **UNIT VI : Embryology**

- 5.1 Microsporangium, microsporogenesis, development of male gametophyte.
- 5.2 Megasporangium, types of ovules, megasporogenesis, development of female gametophyte (monosporic, Bisporic & tetrasporic).
- 5.3 Double fertilization and triple fusion.
- 5.4 Embryo – Classification of embryo.
- 5.5 Endosperm types & significance, Suspended animation

### **LABORATORY EXERCISES**

- 1) Embryology of Angiosperms:
- i) Observation of wide range of flowers available in the locality and methods of their pollination.
  - ii) Study through permanent slides of T.S. of anthers, microsporogenesis, L.S. of ovule, types of endosperms and embryo of *Capsella* .
  - iii) Mounting of T.S. of anthers, Pollen grains and pollinia.
- 2) Anatomy of angiosperms : Preparation of double stained slides of root, stem and leaves of angiosperms mentioned in the syllabus.
- 3) Taxonomy : Description of ten plants belonging to different families in technical language and identification upto family level.

4) Long and short excursion is essential

**Note :** Field tour reports should be supported by exhaustive field notes and photographic representation of plant species studied

**Brassicaceae-** *Brassica*, **Malvaceae-** *Hibiscus, Sida, Malvastrum*,

**Fabaceae-** *Crotalaria, Indigifera, Tephrosia*, **Caesalpinoidae-**

*Caesalpineia, Cassia*, **Mimosoidae-** *Prosopis, Acasia*, **Apiaceae-**  
*Corindrum*,

**Apocynaceae-** *Vinca, Thevetia*, **Asclepiadaceae-**

*Cryptostegia, Calatropis*, **Solanaceae-** *Datura, Solanum, Withania*,

**Euphorbiaceae-** *Croton, Jatropha, Euphorbia*, , **Lamiaceae-***Oscimum*,

*Hyptis*, **Asteraceae-** *Tridax, Lagasca* **Verbanaceae** – *Lantana*,

*Clerodendron*

## **PRACTICAL EXAMINATION**

**Time;- 5 Hours Max. Marks- 50**

Q. 1 Preparation of double stained permanent micropreparation of given angiospermic Material Identification with reasons

10 Marks

Q. 2 Description of given angiospermic plant in technical language, identification up to family, floral formula, floral diagram

( two Plants)

20 Marks

Q. 3 Spotting ( taxonomy-1, anatomy-2, Embryology-2)

10 Marks

Q. 4 Class record, Excursion report with plant photographic

Submission

06 Marks

Q. 5 Submission of micropreparation and viva voce

04 Marks

## **Books Recommended :**

1) **A.C.Dutta** : Text Book of Botany.

2) **Andrews A.N.** : Studies in Paleobotany.

3) **Arnold C.A.** : Introduction of Paleobotany.

4) **Bhojwani & Bhatnagar** : Embryology of Angiosperms.

5) **Chandurkar** : Plant Anatomy

6) **Cutter E.G.**, 1971 : Plant Anatomy Experiment and Interpretation Part-II, Organs, Edward Arnold, London.

7) **Davis P.H.**, and Heywood V.H., 1993 : Principles of Angiosperm

Taxonomy : Oliver and Boyd, London.

**8) Eames E.J.** : Morphology of vascular Plants. edition, prentice Hall of India Pvt.Ltd. New Delhi.

**9) Esau K.** : 1977, Anatomy of seed plant, 2nd Edition, John Wiley and Sons, New York.

**10) Gangulee & Kar** : College Botany Vol.II

**11) Gangulee Das and Dutta** : College Botany, Vol.I

**12) Gifford E.M. and Foster A.S.**, 1988 : Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.

**13) Hartmann H.T. and Kestler D.E.**, 1976 : Plant Propagation Principles and practices, 3rd

**14) Heyhood V.H. and Moore D.M.** (Eds) 1984 : Current concepts in plant Taxonomy. Academic Press, London.

**15) Jeffrey C.**, 1982 : An introduction to Plant Taxonomy, Cambridge University Press, Cambridge, London.

**16) Maheshwari P.** : Introduction of Embryology of Angiosperms.

**17) Pande B.P.** : A Text Book of Angiosperms.

**18) Radford A.E.**, 1986 : Fundamentals of Plant Systematics, Harper and Row, New York.

**19) Rendle A.B.** : Classification of flowering plants, Vol.I & Vol.II.

**20) S.Sundar Rajan** : College Botany, Vol.II & Vol.III.

**21) Shukla & Mishra** : Paleobotany.

**22) Singh and Jain** : Plant Anatomy.

**23) Singh and Jain** : Taxonomy of Angiosperms.

**24) Singh, 4.** 1999, Plant Systematics - Theory and Practices, Oxford and IBH Pvt. Ltd., New Delhi.

**25) Stace C.A.**, 1989. : Plant Taxonomy and Biosystematics (2nd Edition) Edward Arnold, London.

**26) Stewart W.N.**, 1983 : Paleobotany and Evolution of Plants, Cambridge University Press, **Cambridge.Cutter, E.G.** 1969 : Part-I, Cells and tissues, Edward, Arnold, London.

**27) Trivedi B.S. & Sharma B.B.** : Introductory Taxonomy.

**28) Tyagi & Kshetrapal** : Taxonomy of Angiosperms.

**29) Vasistha P.C.** : Plant Anatomy.

- 30) Vasistha P.C.** : Taxonomy of Angiosperms.
- 31) Walton** : An Introduction & Study of fossil.
- 32) Modern Practical Botany, Volume-I, **Dr.B.P.Pande, S.Chand** Publication, New Delhi.
- 33) Modern Practical Botany, Volume-II, **Dr.B.P.Pande, S.Chand** Publication, New Delhi.
- 34) Modern Practical Botany, Volume-III, **Dr.B.P.Pande, S.Chand** Publication, New Delhi.